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DEFENSE INVENTORY

DOD Needs Additional Information for Managing War Reserve Levels of Meals Ready to Eat

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DOD Needs Additional Information for Managing War Reserve Levels of Meals Ready to Eat

Why GAO Did This Study

The Department of Defense (DOD) maintains WRM to reduce reaction time and sustain forces in future military operations. WRM is managed by DLA and the military services. WRM is intended to meet short-term needs until supply pipelines are established. Cost-effective management of WRM that maintains war-fighting capabilities is important as the department faces budget constraints and changes in force structure.

Senate Report 113-176, accompanying S. 2410, a proposed bill for the National Defense Authorization Act for Fiscal Year 2015, included a provision for GAO to review the management of DOD's WRM. This report examines (1) how DOD determines WRM requirements for DLA-managed items, (2) the extent to which DLA has the information needed for MRE inventory decision making, and (3) any strategies DLA pursues to balance cost with readiness in supplying WRM. GAO obtained information from the services on their processes for identifying WRM requirements, reviewed DLA's inventory-management processes and related guidance, and interviewed DLA and military service officials.

What GAO Recommends

To assist with DOD's decision making regarding MRE inventory levels, GAO recommends that DLA conduct analysis to obtain information on MRE industry capabilities and request information on MRE consumption and disposals is shared among DLA and the services as part of existing coordination with the services. DOD concurred with GAO's recommendations.

View [GAO-15-474](#). For more information, contact Johana R. Ayers at (202) 512-5741 or ayersj@gao.gov.

What GAO Found

The military services determine their war reserve materiel (WRM) requirements for Defense Logistics Agency (DLA)-managed items based on operational plans that support warfighting scenarios and other inputs such as deployment schedules and equipment-usage data. WRM can include repair parts, construction equipment and supplies, and chemical protection suits, among other items. Service officials stated that changes to troop end strength, force posture, and force structure could over time be reflected in operational plans, but these factors are more long-term influences than the primary drivers of service WRM requirements for DLA-managed items. DLA compares service WRM requirements against its assets to identify the level of available inventory, including any potential inventory shortfalls, and communicates this information to the military services, which use it to inform their procurement decisions.

DLA monitors various types of data to manage Meals Ready to Eat (MRE), but it lacks other analysis and information that could be useful for managing this category of WRM. DLA monitors data such as purchases from industry and sales to the military services and currently has a yearly purchase objective of 2.5 million MRE cases. Service officials have expressed concerns that in light of changing needs resulting from budgetary effects and reduced end strengths, it may be difficult for the services to consume MREs in the future at a rate that will prevent disposals due to expiring shelf life. However, DLA has not conducted an analysis of the MRE industry to determine the level of purchases needed annually to sustain the industrial base while retaining the ability to meet a surge in requirements. Without conducting an analysis that provides more information on industry capabilities, DLA does not have reasonable assurance that it is balancing readiness and budget priorities with the need to sustain the industrial base in the most efficient way. DLA acknowledges in its strategic plan for MRE inventory that sharing information about the military services' usage patterns among DLA and the services will be vital to making purchase decisions. While the military services provide DLA with their estimated future demand for MREs, DLA does not obtain information from the services, as part of existing coordination efforts, about potential changes to MRE consumption and disposals that could affect future demand. Without obtaining this information from the military services, DLA may be limited in its ability to optimize the supply chain across the department.

DLA uses various supply-chain strategies to balance cost with readiness in meeting the need for items identified as WRM and needed for surges associated with new contingencies or crises. For instance, DLA continues to stock certain types of items, such as those that are military-unique or of limited availability, but seeks to contract for fast access to those items that are readily available on the commercial market, such as medical supplies. Further, for many years DLA has sought to facilitate and improve access to certain items through its Warstopper Program, which addresses weaknesses in certain supply chains, such as MREs, by making targeted investments in industry that guarantee DLA access to materiel and enable industry to increase production when needed.

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Abbreviations

DLA	Defense Logistics Agency
DOD	Department of Defense
MRE	Meals Ready to Eat
WRM	War reserve materiel

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May 7, 2015

Congressional Committees

The Department of Defense (DOD) maintains war reserve materiel (WRM) to reduce reaction time and sustain forces in future military operations.¹ WRM may be prepositioned overseas or aboard ships, stored in DOD warehouses as part of general-issue stocks, or obtained from the commercial market. WRM is generally intended to meet short-term requirements until supply pipelines are established. With the potential for budget reductions and an expected decline in military force structure over the next few years, it will be important for DOD to maintain effective war-fighting capabilities while avoiding excess costs and finding efficiencies where possible. With regard to WRM, it is important that military forces have access to the critical items they need before regular lines of supply are established. Thus, DOD must carefully balance costs with ensuring rapid access to inventory critical for responding to a crisis or new military operation. DOD guidance calls for acquiring, sizing, managing, and positioning WRM to maximize flexibility while minimizing investment.²

WRM is managed by the military services and the Defense Logistics Agency (DLA). The military services are responsible for managing and funding their own WRM programs. However, they rely on DLA for certain items it manages that could be needed for a military operation. DLA manages about one-fifth of DOD's total secondary inventory, including spare parts for military equipment and supplies such as medical items,

¹DOD defines WRM as mission-essential secondary items, principal and end items, and munitions sufficient to attain and sustain operational objectives in scenarios authorized in the Secretary of Defense Guidance to Develop the Force and Joint Strategic Capabilities Plan scenarios for committed forces. See DOD Instruction (DODI) 3110.06, *War Reserve Materiel Policy*, (June 23, 2008).

²DODI 3110.06.

fuel, clothing, combat rations, and construction equipment.³ DLA generally does not separate WRM stock from its other inventory. Rather, WRM stock is comingled with other inventory and DLA issues these stocks in response to customer requisitions, whether for peacetime needs or in response to a surge requirement related to a military operation. DLA manages certain WRM items differently than others. For example, Meals Ready to Eat (MRE)—a type of operational food ration—are managed as a special category of WRM due in part to their shelf-life limitations. DLA acquires MREs and manages the MRE level of inventory for the department until the MREs are sold to one of its customers, such as a military service.

Senate Report 113-176, accompanying S. 2410, a proposed bill for the National Defense Authorization Act for Fiscal Year 2015, included a provision for us to review the management of DOD's war reserve stocks. This report examines (1) how DOD determines WRM requirements for DLA-managed items and inventory available to meet these requirements; (2) the extent to which DLA has information needed for decision making on managing MRE inventory levels; and (3) any strategies DLA is pursuing to balance cost with readiness in supplying DLA-managed WRM.

To describe how DOD determines WRM requirements for DLA-managed items and inventory available to meet these requirements, we reviewed DOD, service, and DLA guidance on WRM management. Through reviews of service-specific guidance and briefings and interviews with service officials, we obtained information about the services' requirements-determination processes and the key inputs into these processes. We met with DLA officials to obtain information on how they use the service-generated requirements, including their processes for identifying inventory available to meet WRM requirements and any

³DOD's secondary inventory includes reparable components, subsystems, assemblies, consumable repair parts, bulk items and materiel, subsistence, and expendable end items (e.g., clothing and other personal gear). In this report, we refer to secondary inventory items as inventory and stock. With regard to spare parts, the military services generally manage reparable parts—items that are generally more cost-effective to repair and reuse than to dispose of and replace by procuring a new item—and DLA manages consumable parts—items that are normally expended or intended to be used up beyond recovery.

associated potential shortfalls.⁴ We obtained and analyzed DLA inventory stratification reports covering fiscal years 2009 through 2014 that included information on WRM requirements, inventory levels, and potential shortfalls over time.⁵ To assess the reliability of the data, we reviewed DOD requirements for inventory reporting and discussed the stratification reports with DLA officials. We determined that the stratification reports provided sufficiently reliable data for the purposes of reviewing service WRM requirements levels in comparison to DLA's other categories of inventory.

To assess the extent to which DLA has information needed for decision making on managing MRE inventory levels, we reviewed DOD WRM management guidance and guidance specific to the subsistence supply chain (which includes MREs) as well as standards for internal control in the federal government related to effective program management and decision making.⁶ We reviewed documents including a 2013 DLA study on WRM levels for MREs and DLA's 2013 strategy for MREs. Additionally, we interviewed officials from DLA and the services who

⁴Inventory shortfalls occur when requirements are greater than available inventory. Excess inventory, in contrast, occurs when there is more inventory than required for current needs and is not retained as retention stock. Accurate demand planning seeks to balance needs and inventory levels to minimize shortfalls or excess inventory. For further discussion of DLA inventory management, see GAO, *Defense Inventory: Actions Needed to Improve the Defense Logistics Agency's Inventory Management*, [GAO-14-495](#) (Washington, D.C.: June 19, 2014).

⁵Per DOD guidance, DLA and the military services are required to stratify and report inventory data biannually as of March 31 and September 30 and use the stratification data to assess the ability of the inventory to meet the stated requirement and ensure that surplus inventories are kept only if warranted. DOD Manual 4140.01, Volume 10, *DOD Supply Chain Materiel Management Procedures: Metrics and Inventory Stratification Reporting*, and Volume 6, *DOD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition* (Feb. 10, 2014). DLA made changes to the structure of its inventory data in October 2009, which meant the earliest data we could use to conduct our analysis were from November 2009.

⁶Internal controls are an integral component of an organization's management that provide reasonable assurance that an entity runs its operations efficiently and effectively, reports reliable information, and complies with applicable laws and regulations. These controls can help managers achieve desired results through effective stewardship of public resources. Internal controls require that an entity must have relevant, reliable, and timely communications relating to internal as well as external events and detailed pertinent information. Management is to obtain relevant data and quality information from reliable internal and external sources in a timely manner based on the identified information requirements. GAO, *Standards for Internal Control in the Federal Government*, [GAO/AIMD-00-21.3.1](#) (Washington, D.C.: November 1999).

manage MREs and discussed, among other things, the types of information they share for managing inventory levels. We obtained and analyzed data on MREs from DLA Troop Support, including MRE purchases, sales, and on-hand inventory to determine trends from fiscal years 2007 through 2014. To assess the reliability of the data, we reviewed DLA requirements for tracking MRE-related information and discussed with DLA officials the processes followed to monitor MRE purchases, sales, and on-hand inventories. We also reviewed any inconsistent information (e.g., out-of-range and missing data) with DLA officials to mitigate any issues identified with the data. Based on these interviews with DLA officials and our review, we determined that the data are of sufficient reliability to describe any trends in MRE inventory. We also met with representatives from the MRE industry to gain their perspectives.

To identify any strategies DLA is pursuing to balance cost with readiness in managing WRM, we focused on the following DLA supply chains: construction and equipment; clothing and textile; industrial hardware; medical; and subsistence. We selected these five of DLA's nine supply chains because they represent a range of items and management strategies.⁷ We analyzed relevant DOD and DLA guidance and met with officials at DLA Troop Support, Philadelphia, Pennsylvania, who manage these supply chains to obtain information on their strategies for managing items and meeting WRM requirements; what considerations may explain differences in the strategies used to manage WRM; and what initiatives, if any, could result in supply-chain efficiencies. We reviewed information that detailed the size and scope of supply chains and documents that included briefings on any recent changes to management strategies or improvements to effectiveness or efficiency as a result of management strategies.

We conducted this performance audit from September 2014 to May 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that

⁷The other four DLA supply chains are aviation, land, maritime, and energy. For a detailed review of DLA's efforts to better manage inventory within the aviation, land, and maritime supply chains, see [GAO-14-495](#).

the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

DOD Supply Chain

The DOD supply chain is a global network that provides materiel, services, and equipment to the joint force. DOD's supply-chain responsiveness and reliability affect the readiness and capabilities of military forces and are critical to the overall success of joint operations. Inventory management, a key component of the DOD supply chain, is the process of determining requirements and procuring, managing, cataloging, distributing, overhauling, and disposing of materiel. DOD manages more than 5 million secondary inventory items, with a reported value of approximately \$98 billion as of the end of fiscal year 2013.⁸ Management and oversight of DOD inventory is a responsibility shared among the Under Secretary of Defense for Acquisition, Technology and Logistics within the Office of the Secretary of Defense; DLA; and the military services. The Under Secretary of Defense for Acquisition, Technology and Logistics and its subordinate, the Assistant Secretary of Defense for Logistics and Materiel Readiness, are responsible for developing materiel-management policies and ensuring their implementation in a uniform manner throughout the department, while DLA and the services are responsible for implementing DOD policies and procedures for materiel management. As of the end of fiscal year 2013, the Army, Navy, and Air Force were responsible for about \$78 billion of DOD's secondary inventory, while DLA was responsible for inventory valued at about \$19 billion.

DLA Inventory Management

DLA manages, integrates, and synchronizes suppliers and supply chains to provide materiel to the military services, allies, and multinational partners. DLA manages mostly consumable items—those that are normally expended or intended to be used up beyond recovery or repair—for the military services. DLA provides support across nine diverse supply chains: aviation, clothing and textile, construction and

⁸Data as of the end of fiscal year 2013 were the latest data available at the time of the review. These values are reported in DOD's annual *Supply System Inventory Report*.

equipment, energy, land, maritime, medical, industrial hardware, and subsistence. To carry out its responsibilities, DLA manages a global network of distribution depots that receive, store, and issue a wide range of commodities owned by the military services, General Services Administration, and DLA. DLA functions through the use of a working capital fund that relies on sales revenue rather than direct appropriations to finance its continuing operations.

DOD guidance requires DLA to assess the ability of the inventory to meet the military services' requirements and ensure that surplus inventories are kept only if warranted. The guidance also requires the services and DLA to group their item inventories into several specific categories, according to the purpose for which they are held. The categorization is designed to provide visibility of DOD inventory requirements, assets (on-hand and on-order), demand, and overages or shortfalls. As specified in DOD guidance, the key inventory categories include the approved acquisition objective, including WRM, and three categories that exceed the approved acquisition objective—economic retention stock, contingency retention stock, and potential reutilization stock.

- Approved acquisition objective: The quantity of an item authorized for peacetime and wartime requirements to equip and sustain U.S. and allied forces, including inventory categorized as WRM.
- Economic retention stock: Materiel that has been calculated to be more economical to keep than to dispose of and repurchase because it will likely be needed in the future.
- Contingency retention stock: Materiel retained to support specific contingencies, such as supporting foreign military sales, future military operations, disaster relief or civil emergencies, or mitigating risk associated with diminished manufacturing sources or nonprocureable stock.
- Potential reutilization stock: Items that have been identified for possible disposal but have potential for reuse and are under review for transfer to DLA Disposition Services.

Military Services' WRM Programs

The military departments are responsible for supplying, organizing, training, and equipping the force. To carry out this responsibility, they are to procure and manage inventory to support the maintenance of their

equipment and to equip the force. Each of the four services has its own organizations responsible for managing inventory.⁹ Similarly, the services are responsible for managing and funding their WRM programs and procuring certain WRM items, while they rely on DLA to provide certain items it manages that could be needed for a military operation. DOD guidance states that service-owned WRM items are to be stored as either starter stocks or swing stocks.¹⁰ DOD guidance does not specifically define the period that is to be supported by WRM, and the services use various periods, such as 60 days, for planning purposes, but this figure can vary by service and item. (App. I provides an overview of the services' WRM programs.)

Meals Ready to Eat

MREs are a type of individual combat, or operational, food ration that is designed to sustain servicemembers engaged in heavy activity. It is considered a primary food ration for the military as it sustains troops in the early stages of a military operation, especially before supply lines are well established. These rations consist of a full meal packed in a flexible meal bag, which is lightweight yet durable for use in difficult environments. While the entree may be eaten cold, it can be heated in various ways and comes with a flameless heater inside the bag. Figure 1 shows an MRE and the contents of an MRE pouch.

⁹For more information on the inventory-management practices of the Army, Navy, and Air Force, see GAO, *Defense Inventory: Services Generally Have Reduced Excess Inventory, but Additional Actions Needed*, [GAO-15-350](#) (Washington, D.C.: Apr. 20, 2015).

¹⁰Starter stocks are WRM stocks prepositioned in or near a theater of operations, and are designed to last until supply is established. Swing stocks are WRM stocks positioned ashore or afloat for meeting war reserve requirements of more than one contingency in more than one theater of operation. See DODI 3110.06.

Figure 1: Meal Ready to Eat (MRE) and Contents



Source: GAO. | GAO-15-474

Once field feeding can begin during a military operation, the military services seek to transition from MREs to other types of rations, such as group rations that can be used to heat and serve meals for 50 individuals per pack, and then later to dining facility-prepared meals, once those capabilities exist. As a result, MREs may be crucial for the early stages of a military operation. We found in April 2005 that U.S. forces in Iraq experienced temporary shortages of MREs during the deployment and major combat phases in early 2003 before dining facilities were established, and data showed that both the Army and Marine Corps were at risk of running out of food if supply distribution was hindered.¹¹ We found that these shortages resulted from both ineffective distribution, specifically a lack of sufficient logistics resources that hindered DOD's efforts to move MREs promptly from ports to the units that had ordered them, as well as from inadequate supply forecasts.

¹¹GAO, *Defense Logistics: Actions Needed to Improve the Availability of Critical Items during Current and Future Operations*, [GAO-05-275](#) (Washington, D.C.: Apr. 8, 2005).

During peacetime, MREs are typically consumed during training, such as field exercises. MREs have limited shelf-life (typically 3 years), so stocks must be regularly rotated and used to minimize disposals.¹² As such, MREs are a special category of WRM that is managed differently than other DLA-managed items. All MREs owned and managed by DLA are considered WRM while at the same time are issued to support peacetime needs such as training.

In 2004, the Deputy Secretary of Defense designated the Director of DLA as the Executive Agent for the department's subsistence supply chain, which includes MREs.¹³ According to DLA officials, the Director of DLA delegated this authority to DLA Troop Support. As the Executive Agent, DLA is to plan for, procure, manage, distribute, and ensure the wholesomeness of subsistence products throughout the supply chain, as well as to deliver items as needed.¹⁴ Further, DLA is to maintain war reserve subsistence stocks. DLA purchases MREs from three primary U.S. vendors through its working capital fund. A DLA study from July 2013 described the specifications of contracting with these three companies, stating that each year, MRE production percentages by vendor are readjusted to ensure maximum production capability among the three vendors. DLA officials stated that each vendor is guaranteed at least a 20-percent award of the total annual quantity, but no firm will receive an award in excess of 50 percent.¹⁵

¹²MREs have a shelf life of 3 years when kept at or below 80 degrees Fahrenheit. They degrade faster at higher temperatures, but shelf life can be extended up to 5 years when kept in cooler temperatures.

¹³The subsistence supply chain includes food and food-related supplies, including condiments, utensils, paper products, and bottled water. Department of Defense Directive 5101.10, *DOD Executive Agent for Subsistence* (Sept. 27, 2004).

¹⁴As defined in DOD guidance, a DOD Executive Agent is the head of a defense component to whom the Secretary of Defense or the Deputy Secretary of Defense has assigned specific responsibilities, functions, and authorities to provide defined levels of support for operational missions, or administrative or other designated activities that involve two or more of the DOD components. See Department of Defense Directive 5101.1, *DOD Executive Agent* (Nov. 21, 2003).

¹⁵MRE prices fluctuate depending on the production percentage assigned to each vendor. For example, DLA reports that under a recent contract (which split production into 40 percent, 35 percent, and 25 percent portions), the price was \$49.19 per case for the vendor producing 40-percent volume, while the price was \$64.14 per case for the vendor with the 25-percent award. Each case of MREs contains 12 individual MREs.

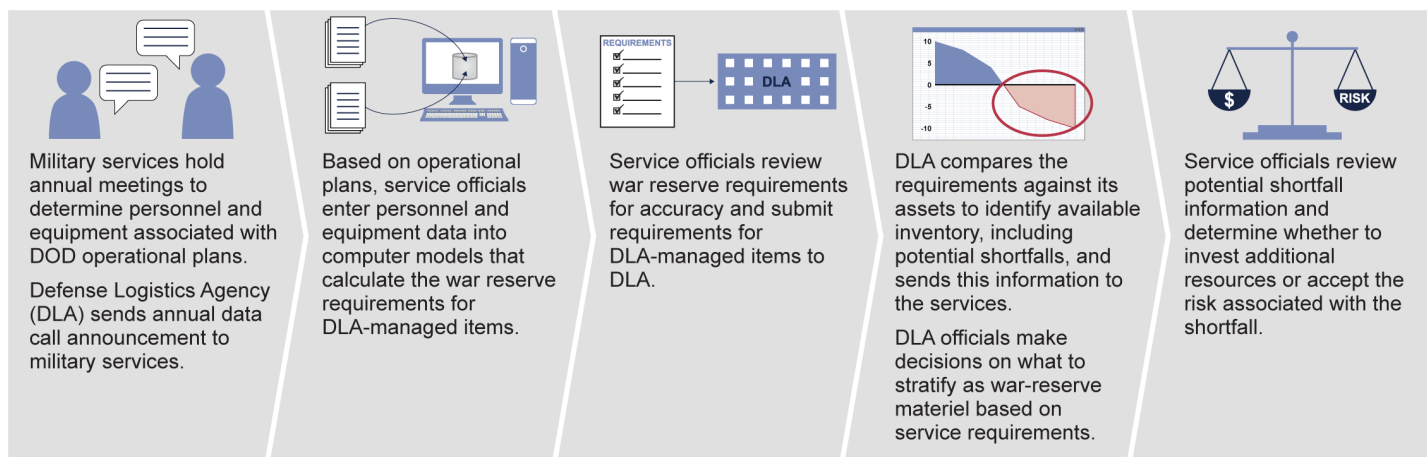
DLA-owned MREs are stored in temperature-controlled facilities to maximize shelf-life. DLA rotates MREs on a regular basis by issuing the stock with least remaining shelf life for use in training exercises or other needs to the services to maximize the use of the product and associated resources. The sale of MREs to the services replenishes the DLA working capital fund; the rates that DLA charges the services are higher than the purchase prices from its vendors to recoup DLA's expenses for contract fees, transportation, storage, and other overhead costs. In fiscal year 2014, the rate that DLA charged the services for an MRE case was about \$100.

Operational Plans Drive the Services' WRM Requirements, and DLA Identifies Available Inventory and Potential Shortfalls for Items It Manages

DLA has established an annual process with the military services to obtain their WRM requirements for most DLA-managed items and to assess the extent to which it has inventory available to help meet those requirements. After DLA issues a data call, the services identify their WRM requirements for DLA-managed items, which are determined primarily using operational plans and other related inputs.¹⁶ DLA compares the service-identified WRM requirements against its assets to identify the level of available inventory, including any potential shortfalls, and communicates this information back to the military services, which in turn use this information to make procurement decisions regarding WRM. Figure 2 shows the processes for determining WRM requirements and available inventory for DLA-managed items.

¹⁶As a special category item, MREs are not included in this annual requirements process. DLA's management of MREs is discussed later in this report.

Figure 2: Processes for Determining War Reserve Materiel (WRM) Requirements and Available Inventory for Defense Logistics Agency (DLA)-Managed Items



Source: GAO analysis of Department of Defense (DOD) information. | GAO-15-474

Services Use Operational Plans and Other Inputs in Determining WRM Requirements

The military services determine their WRM requirements for most DLA-managed items based on operational plans that support warfighting scenarios approved by the Joint Chiefs of Staff and other inputs such as deployment schedules and equipment usage data. DOD guidance directs how WRM requirements are to be determined and requires that the military services calculate war reserve requirements annually, based on current defense strategic guidance.¹⁷ Service-specific guidance provides further detail on the requirements process. For example, the Army's regulation requires that DOD guidance be used to provide the war-fighting scenarios necessary to guide WRM requirements determination.¹⁸ Marine Corps guidance specifies that other information, such as time-phased force-deployment data, shelf-life information, and equipment-usage data, among other factors, be used to determine requirements for certain classes of materiel.¹⁹

¹⁷DODI 3110.06.

¹⁸Army Regulation 710-1, *Centralized Inventory Management of the Army Supply System* (Sept. 20, 2007).

¹⁹Marine Corps Order 4400.39, *War Reserve Materiel Policy* (Feb. 8, 2011).

For the requirements determination process for DLA-managed items, the Army, Marine Corps, and Air Force begin their coordination with DLA when DLA issues an annual data call requesting them to submit their WRM requirements for DLA-managed items. Navy officials stated that the Navy does not participate in this data call; materiel needed during deployment is stocked on deployed ships as part of the Navy's allowancing process (see app. I). DLA officials stated that the data call is typically sent to the services around November or December each year. For fiscal year 2014, DLA sent the data call to the services in December 2013 and asked that they provide their WRM requirements to DLA by January 2014.

In implementing DOD and service guidance, officials from the Army, Marine Corps, and Air Force stated that approved operational plans are the primary drivers for service WRM requirements for items that are covered by DLA's annual data call. Operational plans are developed by military planners to support war-fighting scenarios set forth in broad defense strategic guidance provided by the President, the Secretary of Defense, and the Chairman of the Joint Chiefs of Staff.²⁰ Service logistics officials stated that operational plans generate the selection of military units, which in turn have associated personnel and equipment, and thus are the major driver of WRM requirements. Associated information, such as time-phased force-deployment data that support an approved operational plan, is likewise used for determining requirements. For example, Air Force logistics officials stated that operational plans are used as the basis to determine requirements for WRM, and that three theater working groups determine the personnel and equipment necessary to support those operational plans in each of the component commands by reviewing, validating, and planning the movement of WRM

²⁰An operational plan describes how DOD will respond to a potential contingency that might require the use of military forces. These plans are used to deal with a wide range of events, such as terrorism, hostile foreign nations, and natural disasters. Plans generally include assumptions that are relevant to the development or successful execution of the plan, including the forces involved, the phasing of operations, and the general nature and purpose of operations to be conducted. An operational plan consists of a base plan and annexes. A base plan describes the concept of operations, major forces, sustainment concept, and anticipated timelines for completing the mission. In addition to the base plan, operational plans sometimes include annexes that provide further details on areas such as intelligence, operations, logistics, and personnel, among others.

globally.²¹ Similarly, Marine Corps officials stated that annual discussions are held during which leadership from each Marine Expeditionary Force determines WRM requirements based on the personnel and equipment needed to support selected operational plans.²² Army logistics officials stated that operational plans drive the entire process of determining both Army prepositioning and WRM requirements.

Each service that participates in the annual data call uses modeling programs to develop and compute WRM requirements needed to support operational plans. These models contain information such as historical usage data and equipment maintenance information. Army logistics officials stated that officials responsible for operations and planning determine what types and numbers of units would be necessary to carry out a given operational plan, and these units would have a defined level of personnel and equipment that would make up the parameters of the data entered into modeling programs. The Army has various modeling programs to determine WRM needs for prepositioned and sustainment stocks. To develop sustainment WRM requirements, for example, it maintains a modeling program that uses actual data from training and contingencies that are uploaded to the model every 90 days. Air Force officials stated that the decisions regarding units and equipment made during theater working-group discussions are input into an Air Force data system that computes WRM requirements. Marine Corps logistics officials stated that to develop WRM requirements, they use technical data, such as equipment and personnel data, that comes from authoritative data sources and service systems of record, and a computer modeling program computes the WRM requirements.

Some service officials stated that changes to troop end strength, force posture, and force structure could over time be reflected in operational plans, and ultimately affect WRM requirements, but these factors are more long-term influences than the primary drivers of the annual WRM requirements that are the focus of DLA's annual data call process. Regarding troop end strength, Marine Corps logistics officials stated that

²¹The three theater working groups identify WRM requirements for the component commands, which are U.S. Air Forces in Europe, Pacific Air Forces, and U.S. Air Forces Central Command.

²²The three Marine Expeditionary Forces are based in Camp Pendleton, California (I MEF); Camp Lejeune, North Carolina (II MEF); and Okinawa, Japan (III MEF).

missions do not change as a result of increases or decreases to end strength. One official added that operational plans are largely independent from end strength, since forces will always be first devoted to contingencies, with the services assuming risk in other areas as a result of decreases in end strength. Air Force logistics officials stated that factors such as troop end strength or force posture do not necessarily affect WRM requirements, especially in the short term, although over time they may do so. For example, if changes in force posture were to lead to the closure of bases in Central Command, then the Air Force would eventually most likely review moving excess WRM from that location to other locations, or if cheaper than moving they may choose to divest of the WRM by disposal or sales. Further, the officials stated that the availability of funding and transportation and storage costs affect WRM considerably as these factor into decisions about how the Air Force could best support operational plans.

As they determine their WRM requirements for DLA-managed items, some service officials stated they review their service's inventory levels and prepositioned stocks to determine what inventory is already in place. The services can then determine and submit their WRM requirements to DLA for analysis.

DLA Compares the Services' Requirements to Assets to Identify Available Inventory and Any Potential Shortfalls in DLA-Managed Items

DLA compares the service-identified WRM requirements against its assets to identify the level of available inventory, including any potential shortfalls, and communicates this information back to the military services. DLA guidance states that it will identify to the services the DLA-managed WRM assets available within its stocks or from industry.²³ The guidance states that DLA also will identify potential shortfalls in DLA-managed assets so that the services can budget to procure additional stocks if they choose.

After the military services submit their WRM requirements, typically by January each year, DLA screens the total service WRM requirements against its own inventory levels. DLA also considers inventory that is available through surge clauses within existing contracts and reviews possible acceptable substitutes for inventory with identified potential shortfalls. Based on this analysis, DLA identifies the amount of each

²³DLA Instruction 1206, *War Reserve Material (WRM)* (Sept. 10, 2009).

service's WRM potential shortfalls, if any, by inventory item and provides this information to each of the services by the end of March.

Service officials told us that DLA's information on potential WRM shortfalls is the starting point for their decision-making on potential procurements. The officials said they review the potential shortfalls and the criticality of the items and determine what level of risk is acceptable, which then drives a procurement budgetary decision. The military services must either accept the risk associated with the WRM shortfall or address the potential shortfall by investing resources in acquiring additional inventory. DOD guidance states that the military services are responsible for programming and funding the acquisition of WRM when requirements exceed assets and no offset agreement can be reached, and also for completing a risk assessment to identify any negative impacts on readiness resulting from non-programmed and unfunded requirements or when they choose to reallocate resources to other priorities.²⁴ Service-specific guidance details the offices and organizations responsible for determining requirements and assessing the criticality of items against potential shortfalls. For example, Army logistics officials stated that Army budgetary priorities can change dramatically based on the potential WRM shortfalls identified by DLA.

DLA Monitors Data on MREs but Lacks Analysis and Information That Could Be Useful for Managing Inventory Levels

As the DOD Executive Agent for subsistence, DLA monitors various types of data on MREs, but it lacks other analysis and information that could be useful for managing inventory levels. Among the types of data DLA monitors are its purchases from the MRE industry and its sales to the military services, factors that cause MRE inventory levels to fluctuate over time. Military service officials expressed concerns that in light of changing needs, it may be difficult for the services to consume MREs in the future at a rate that will prevent disposals due to expiring shelf life. However, DLA has not conducted recent analysis to determine the level of purchases needed annually to sustain the current industrial base while retaining the ability to meet a surge in requirements. In addition, while the military services provide DLA with their estimated future demand for MREs, DLA does not obtain information from the services, as part of existing coordination efforts, about potential changes to consumption and

²⁴DODI 3110.06.

disposals that could affect future demand. Such analyses and information could be useful to DLA in managing MRE inventory levels.

DLA Monitors Various Types of Data to Manage MREs within the Identified WRM Requirement

DLA's MRE inventory levels are not set through the annual data call but are managed against an identified war reserve requirement, with DLA monitoring various types of data to set exact purchase levels. DOD can experience a surge in MRE requirements for various reasons, including military operations, natural disasters, and other emergencies. To satisfy a surge requirement if needed, DLA maintains a certain level of MREs as WRM inventory that is owned and managed by DLA. DLA has identified an MRE war reserve level of 5 million cases.²⁵ The current level was established in fiscal year 2005 at a time when U.S. military operations were ongoing in Iraq and Afghanistan. DLA officials stated that DLA purchases up to the WRM level, meeting the 5 million case level through a combination of on-hand assets and assets that are due to be delivered within a 12-month period. According to a 2013 DLA study, while DLA is not obligated to purchase a specific amount of MREs per year from its suppliers, it currently has an annual purchase objective of 2.5 million MRE cases. This purchase objective represents an annual minimum target for MRE purchases from industry.

As DLA manages MREs within the WRM level of 5 million cases, it monitors various types of data to determine the exact amount of MRE purchases that will be made and when. For example, DLA monitors yearly sales estimates that are provided by the military services, information provided by the services about their ability to consume MREs through training, and agreements in place with the military services about storage

²⁵H.R. Conf. Rep. No. 108-283, accompanying the Department of Defense Appropriations Act, 2004 stated that the identified war reserve requirement for MREs was 6 million cases and directed the Secretary of Defense to fund the requirement in DOD's fiscal year 2005 budget submission, with the goal of fulfilling the total war reserve requirement of 6 million cases by fiscal year 2006. A DLA subsistence official stated that the war reserve requirement was partially funded in fiscal year 2005, allowing DLA to purchase up to 5 million cases of MREs per year. DLA did not receive funding in fiscal year 2006 to purchase the remaining 1 million cases of MREs. As directed by the Senate Armed Services Committee in S. Rep. No. 109-254, accompanying the National Defense Authorization Act for Fiscal Year 2007, DLA reviewed MRE war reserve levels in 2007 and determined that DLA could meet war reserve requirements with an inventory level of 5 million cases of MREs. The identified requirement level has thus remained at 5 million cases. This identified requirement level includes prepositioned war reserve materiel for the military services and other war reserve materiel for general use.

and transportation of MREs. While operational plans are the primary driver for WRM requirements determination for other DLA-managed items, numerous factors are at play as DLA plans MRE purchases to buy towards the level of WRM. For example, service officials told us that end strength is not a key factor for deciding WRM requirements for other items. In contrast, end strength is important for MRE WRM levels because end strength levels directly affect the number of MREs that can be consumed in training exercises and thus the amount of MREs that can be rotated in a given year and that would be replaced by future purchases.

DLA monitors purchases from industry and sales to the services for planning purposes. According to DLA officials, the goal is to ensure that the services' MRE requirements are met in the most efficient and effective manner possible. DLA also seeks to ensure that appropriate plans are in place to rotate the WRM stocks of MREs to prevent the need for disposals. For example, DLA officials stated that the war reserve stocks of MREs with the shortest shelf life are to be rotated out first to prevent disposal. Therefore, DLA uses information about service training cycles to help plan the rotation of the oldest stock. This information affects the amount of MREs that will need to be replaced as WRM through additional purchases from industry, all while monitoring on-hand and on-order MRE inventory levels as compared to the WRM level. DLA officials stated that DLA uses information such as its knowledge of DOD priorities, service training cycles, and updates on service training and operational activities obtained through monthly telephone calls and other regular interaction with the services to forecast service demand for MREs and further inform planning.

Further, DLA has performance-based agreements with the Army, Navy, Marine Corps, and Air Force that detail the specific amount of MRE war reserve stocks that DLA will deliver to a specific location within a defined time frame. This information is also tracked by DLA and can further affect inventory levels and the requirement to purchase additional MREs. For example, the performance-based agreement between DLA Troop Support and the Army signed in March 2013 specifies the total number of MRE cases stored by DLA for the Army in locations in the continental United States, Europe, Hawaii, Japan, Korea, and Southwest Asia, as well as aboard Army prepositioning ships. The agreement sets forth responsibilities of DLA Troop Support, such as to (1) stock and store the levels of MREs in DLA- or DLA-commercial-provided storage, (2) rotate the MREs through the DLA customer base, (3) maintain the capability to deliver the MREs in certain time frames depending on location and

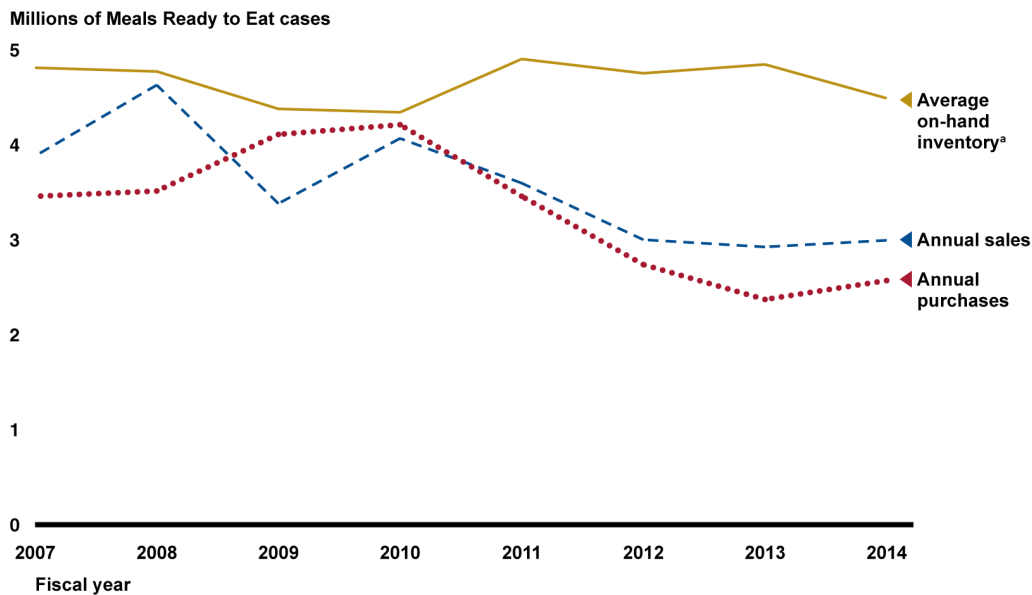
situation (for crisis or contingency needs as opposed to peacetime needs), and (4) maintain records of MRE stocks, among other duties. Similarly, the agreement details the responsibilities of the Army, which include the need to notify DLA Troop Support upon execution of contingency operation plans and peacetime exercises to allow for the release of stocks and to submit requisitions to DLA Troop Support for MREs with specific lead times that vary by location and situational need.

DLA officials stated that as with other types of WRM, the Navy does not operate in the same manner as the other services. Through the allowancing process described earlier, the Navy outfits its ships with stocks in advance of a deployment. The DLA and Navy entered into a performance-based agreement in 1984 that has remained unchanged since that time. Under the agreement, DLA is to be able to provide about 20,000 cases of MREs for the Navy in the continental United States.

MRE Inventory Levels Fluctuate Based on Flow of Purchases and Sales, and DLA Has Periodically Reviewed War Reserve Levels

DLA's MRE inventory levels fluctuate based on the flow of purchases from industry and sales to the services, as shown in figure 3. Based on data from fiscal years 2007 through 2014, on average DLA purchased 3.3 million MRE cases from industry per year and sold 3.56 million cases per year to the services. The average on-hand inventory level was about 4.66 million cases. In addition, the data show that the average yearly MRE sales to the services decreased from about 4 million cases in fiscal year 2010 to 3 million cases in fiscal year 2012 and remained relatively constant at around 3 million cases from fiscal years 2012 through 2014. There were also decreases in annual purchases from suppliers starting in fiscal year 2010.

Figure 3: Annual Defense Logistics Agency (DLA) Purchases and Sales of Meals Ready to Eat (MRE) and Average On-Hand MRE Inventory for Fiscal Years 2007 through 2014



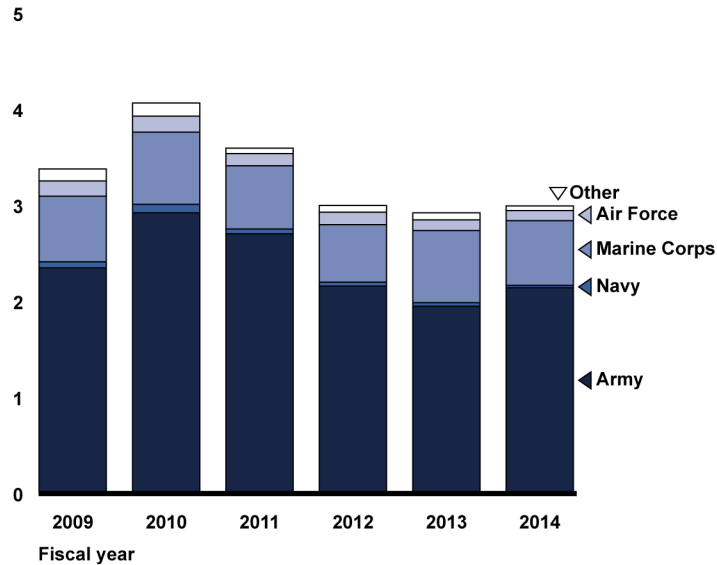
Source: GAO analysis of Defense Logistics Agency (DLA) data. | GAO-15-474

^a Average on-hand inventory represents the annual average of on-hand inventory that is reported every month, by fiscal year.

The services have different requirements for, and therefore purchase different amounts of, MREs. As shown in figure 4, the Army is the largest purchaser of MREs.

Figure 4: Meal Ready to Eat (MRE) Sales to the Military Services for Fiscal Years 2009 through 2014

Millions of Meals Ready to Eat (MRE) cases



Source: GAO analysis of Defense Logistics Agency (DLA) data. | GAO-15-474

In addition to monitoring sales and purchase data, DLA has conducted several reviews since 2003 to determine whether the war reserve level is appropriate based on potential contingency requirements, historical demand, and industry capability.

- A DLA study conducted in 2003 reviewed the processes used to determine war reserve requirements for MREs and found that the war reserve level could be maintained at 4.1 million cases.²⁶
- A DLA study conducted in 2007 analyzed historical sales data that included a worst-case planning scenario and found that the war reserve level could be within the range of 3.2 million to 5 million cases.²⁷

²⁶Defense Logistics Agency, Defense Supply Center Philadelphia, *Validation of the MRE Requirements Determination and Acquisition Processes* (July 2003).

²⁷Defense Logistics Agency, *Report to Congress—Meal Ready to Eat War Reserve Material* (January 2007).

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- A DLA study completed in July 2013,²⁸ using a methodology similar to that of previous studies, found that the level of MRE on-hand inventory could be at a range between 3.45 million and 3.96 million cases of MREs to support contingency requirements, efficiently manage resources, and sustain the industrial base.²⁹ The 2013 study stated that reasons for the proposed decrease in MRE on-hand inventory included less demand for MREs from fiscal years 2010 through 2012; the withdrawal of U.S. troops from Iraq and Afghanistan; the possible effects of sequestration on force structure; and an increased capacity reported by the MRE industry to meet surge requirements. Further, the Federal Emergency Management Agency moved from using military grade MREs to commercially available alternatives, meaning that the demand for MREs is further reduced. In addition, the study noted that other troop feeding options such as new types of rations and dining facilities that can be quickly established could reduce dependence on MREs during contingency operations.

Although DLA's 2013 study supported a lower war reserve inventory level for MREs, DLA issued an MRE strategic plan in September 2013 stating that after subsequent analysis, DLA leadership decided to maintain the current level of 5 million cases and revisit this level after 2014.³⁰ As of March 2015, DLA officials stated that an update to the MRE strategic plan was under review. According to DLA officials, higher-than-expected demand for MREs occurred in fiscal years 2013 and 2014. Prior estimates for those 2 years were 2.3 million to 2.7 million cases, but actual sales were around 2.9 million each year. Officials attributed the higher-than-anticipated demand to increased training needs during peacetime and to small-scale deployments in response to crises such as the Ebola virus epidemic in Africa and tensions in Syria and the Ukraine. The 2013 MRE strategic plan projected purchases of 2.3 million to 2.5

²⁸Defense Logistics Agency Operations Research and Resource Analysis, *Meal Ready-to-Eat (MRE) Study for DLA Troop Support* (July 2013).

²⁹According to DLA's 2013 MRE strategic plan, MRE suppliers must be producing MREs on a consistent basis to ensure they can sustain production and surge when necessary.

³⁰Defense Logistics Agency, *Meal, Ready-to-Eat (MRE) Strategic Plan* (September 2013). The Senate Armed Services Committee report accompanying the National Defense Authorization Act for Fiscal Year 2014 directed DLA to develop an MRE strategic plan. S. Rep. No. 113-44.

million cases a year through fiscal year 2016, a level that, according to the plan, will allow DLA to uphold the war reserve level of 5 million cases.

Military Services May Not Be Able to Maintain Sufficient Rotations of MREs through Future Consumption

Military service officials who manage MREs expressed concerns that in light of changing needs, resulting from budgetary impacts and smaller end strengths, it may be difficult for the services to consume MREs in the future at a rate that will allow them to maintain sufficient rotations of MREs and prevent disposals due to expiring shelf life. Army and Marine Corps officials stated that they did not believe reduced purchases of MREs would result in shortages, but they also cautioned that since MREs are critical for military operations, it is important that the MRE industry be able to increase production to meet a surge in need.

According to service officials, each service estimates the amount of MREs needed for training and other purposes. These estimates are largely based on training plans and are submitted to DLA annually. According to service officials, these estimates have ranged from about 3.2 million to 3.6 million cases per year over the past several years. Service officials stated that they are responsible for monitoring MRE consumption and ensuring that their service works towards purchasing the estimated amounts from DLA. Service officials also stated that they track use of MREs to the unit level for training or operational needs. However, they acknowledged that they may not always know if MREs are consumed or disposed of. For example, an Air Force subsistence official stated that the Air Force has recently begun to track MRE disposals and he knew that disposals occurred, but he could not identify how many disposals had occurred. A Marine Corps subsistence official stated that some MREs are disposed of due to issues such as accidental improper storage, and the Marine Corps' subsistence office would only know this information if the unit decided to report the disposal. An Army subsistence official stated that he receives reports on MRE disposals, but that the reports may not always be complete and reliable.

The performance-based agreements between DLA and each service establish the policies, procedures, and responsibilities concerning operational rations support to the service by DLA. According to these agreements, DLA is financially responsible for inventory losses unless the losses result from a service's inability to rotate inventory within the required time limits; then the loss is the responsibility of the service. Some service subsistence officials stated that it can be challenging to meet the rotation demands in these agreements through training and operational use of MREs. Service subsistence officials also stated that

disposal of unused MREs is costly, and that MREs cost almost as much to dispose of as to purchase because they must be disposed of in certain ways due to the flameless heating component.³¹

With regard to the current MRE war reserve level of 5 million cases, Army and Marine Corps officials stated that they have been able to meet the required rotation demands in recent years, and that they believe that MRE disposals have not been a major issue. However, officials stated that, in the coming years, decreasing troop end strength will likely result in fewer service members to train. Because many MREs are consumed during field training, reductions in the number of service members therefore are likely to decrease the services' overall demand for MREs. For example, the DLA study conducted in 2013 stated that the Army planned to reduce its MRE war reserve levels by 200,000 cases due to decreases in troop end strength. Army officials told us that they expect that planned reductions in troop end strength will reduce MRE consumption. Army and Marine Corps officials also stated that, while MREs are of critical importance because they are a primary food ration for sustaining military forces during the early phases of military operations, their experience shows that the current war reserve level of 5 million cases per year is probably not necessary and that they would support DLA maintaining a lower inventory level of MREs. However, these officials stated that the level would ultimately depend on industry capabilities to meet surge needs.

Officials from the Army's subsistence program stated that they have been concerned for several years that withdrawals from operations in Iraq and Afghanistan would result in substantial amounts of MREs that the Army could not consume. One official stated that although MRE disposals due to lack of consumption have not yet been an issue for the Army, two events likely prevented the need for disposals in recent years. First, according to Army and DLA officials, in 2012 a warehouse fire in Afghanistan destroyed around 125,000 cases of MREs. Second, the 2011 tsunami in Japan destroyed around 100,000 cases of MREs. Army subsistence officials also stated that due to concerns about the Army being able to use enough of the MRE stock stored in Japan, DLA and the Army chose to restock the Japan levels to 4,800 cases instead of the 100,000 cases that were stored there prior to the tsunami. Further,

³¹Each case of MREs cost the services about \$100 in fiscal year 2015.

service and DLA officials stated that there are 300,000 cases of MREs from fiscal year 2011 stored in a cold-storage warehouse facility that had been held back from consumption to undergo extensive testing to ensure the cases were not infested with a certain type of beetle. While the MREs were ultimately deemed safe for consumption through 2015, service officials expressed concerns that the MREs were at the end of their shelf life and, consequently, they did not want to accept them from DLA. However, they added that it may be necessary to accept the MREs to prevent a large-scale disposal. An Army official stated that while this issue stemmed from a possible infestation that required MREs to be taken out of rotation and tested, it had altered the flow of MREs from various fiscal years and problems with meeting rotational levels would continue. DLA officials stated that this was a one-time occurrence and they did not share the Army's concern.

In addition, an official from the Air Force's subsistence program stated that Air Force demand for MREs may decrease in the coming years as a result of shortening the duration of basic training. While shorter training may result in less consumption of MREs, the official stated that the Air Force uses fewer MREs than the Army and Marine Corps and is therefore not as concerned about the ability of the Air Force to rotate MREs if the war reserve level remains at 5 million cases, provided that funding for the Air Force's rotation program remains available. The official stated that Air Force war reserve levels for MREs may decrease in certain areas such as Europe due to a focus on operations elsewhere, but that the Air Force's overall war reserve requirement was unlikely to decrease dramatically in the coming years.

DLA Lacks Analysis on Purchase Levels Needed to Sustain the Industrial Base and Information on the Services' MRE Usage

Although DLA monitors various data on MREs, as previously discussed, it lacks analysis on the level of MRE purchases needed to sustain the industrial base while maintaining surge capability. More specifically, DLA has not assessed whether its annual purchase objective of 2.5 million cases is valid. Further, DLA's ability to forecast the number of MREs the services will need is limited to some extent because DLA does not obtain information from the services about their usage of MREs, including consumption and possible disposals. *Standards for Internal Control in the Federal Government* state that an agency needs relevant, reliable, and timely information to effectively and efficiently run its operations and make

appropriate decisions.³² Further, DOD guidance states that the department's materiel management shall operate as a high-performing and agile supply chain responsive to customer requirements during peacetime and war while balancing risk and total cost.³³

DLA has not conducted a recent detailed analysis to determine the level of MRE purchases from industry necessary to sustain the current industrial base while retaining the ability to meet a surge capability. Although DLA has an annual purchase objective of at least 2.5 million cases, officials stated that this number reflects an unofficial agreement with the MRE industry and is based on limited information from industry rather than on a DLA analysis of industry capabilities. Further, DOD has acknowledged that DLA's future acquisitions of MREs may need to address a reduced annual purchase objective to avoid disposal of unused stock. DOD noted that reduced acquisitions could challenge the department's ability to meet surge requirements. However, the 2013 MRE strategic plan states that it is a challenge for DOD to determine what quantities of MRE sales will keep each of the MRE suppliers producing at a level that sustains the industrial base to meet the needs of the department as well as respond to a surge requirement that could occur. The strategic plan further states that a minimum sustaining rate study could be conducted to develop this type of analysis. A 2013 review conducted by DLA to assess the appropriateness of the MRE war reserve level states that such a study would require the participation and cooperation of industry.³⁴ DLA officials stated that this type of analysis was conducted more than 20 years ago regarding the MRE industrial base, but noted that this dated analysis would not reflect the current industrial base.

³²[GAO/AIMD-00-21.3.1](#).

³³DOD Instruction 4140.01, *DOD Supply Chain Materiel Management Policy* (Dec. 14, 2011).

³⁴The term "minimum sustaining rate" means the production rate for each budget year that is necessary to keep production lines open while maintaining a base of responsive vendors and suppliers. Minimum sustaining rate studies are conducted when it is unlikely an industrial base can sustain adequate production capability for critical go-to-war items. These studies include a breakeven analysis to determine the lowest production rate that will permit a contractor to recover its costs. This rate is based on the contractor's fixed and variable costs projected over a specified time frame (normally the next year), and selling price for the item being reviewed. In addition, these studies include a demand analysis to assess the extent of forecasted demand expected in the future in order to evaluate the gap, if any, in requirements relative to the breakeven point.

DLA officials told us that this type of analysis has been conducted on other supply chains, and that while this type of study can be performed by an outside party such as a contractor, an office within DLA routinely conducts these studies. For example, in 2013, DLA conducted a minimum sustaining rate study and other industrial capability assessments of the three manufacturers of a certain type of parachute that had high demand during the height of military operations in Afghanistan, but now has far less demand as a result of the drawdown. DLA subsequently reported that information collected about its own demand patterns and the capabilities of the manufacturers was used to determine the most cost-effective industrial solution for that particular item.

According to DLA officials, DLA has not conducted a minimum sustaining rate study or other similar analysis for MREs because industry would have to provide access to financial and production records. Access to such records is provided by companies for any minimum sustaining rate study conducted by DLA, as was the case for the study on parachute manufacturers discussed previously. However, DLA officials stated that DOD cannot require a supplier to provide the financial data needed to complete a minimum sustaining rate study. DLA may request the suppliers agree to such a financial audit, as was the case for the study on parachute manufacturers discussed previously. While DLA officials told us that they obtain some information from MRE suppliers on their capabilities, DLA stated in both its 2013 MRE study and the 2013 strategic plan that it is difficult to know the capabilities of the MRE industries without more detailed information provided by industry, since as stated in its strategic plan, the companies have expanded product lines and customer bases. For example, the three suppliers are expanding their commercial business to make MRE-like rations and other products available to the public (such as shelf-stable meals and pouched foods) and producing other types of operational rations, such as first strike rations and unitized group rations.³⁵

DLA has conducted recent analyses of the supply chains for other types of operational rations. In 2014, DLA conducted an analysis of the first

³⁵The first strike ration is a compact, eat-on-the-move ration designed for short durations of highly mobile, high-intensity combat operations. The unitized group ration is used to sustain military personnel during operations that allow organized food service facilities; it includes all components for a complete 50-person meal, with the exception of enhancements like fresh fruit.

strike rations and unitized group rations that have low or zero peacetime demand. DLA's analysis focused on possible strategies to assist the subsistence industry in quickly ramping up production of these rations. DLA officials noted that this analysis included a review of and data from the operational ration industry that produces MREs. However, several companies that do not produce MREs were part of this analysis, and one major MRE supplier was not included in this analysis. Additionally, DLA conducted an analysis in 2010 that assessed various acquisition strategies for MREs, from continuing its current strategy of relying on three selected MRE suppliers to pursuing full and open competition among possible suppliers. As part of this analysis, DLA reviewed the industrial capabilities that exist among MRE suppliers relative to projected DOD surge needs. However, the analysis did not determine the level of MRE purchases from the current three suppliers that can sustain the industrial base, and it did not include an assessment of the validity of the current 2.5 million case purchase objective.

Without conducting an analysis to determine the amount of annual MRE purchases needed to sustain the industrial base and respond to surge needs, DLA lacks information that would be useful for managing MRE inventory, including an assessment of the validity of the 2.5 million case purchase objective and an understanding of the potential consequences of falling below the annual purchase objective. DLA officials told us that it is important to appropriately balance risk and cost and ensure that the services have MREs as needed while best using resources. Further, as previously discussed, DLA conducted reviews to assess the appropriateness of the MRE war reserve levels in 2003, 2007, and 2013. All of these reviews resulted in various conclusions to either hold constant or reduce purchases, as they were based mostly on DOD's projected demand for MREs and not a detailed analysis of industry capabilities. Such analysis could be useful to DLA in managing MRE inventory.

In addition, although DLA coordinates with the military services to obtain information on MRE requirements and demands as previously discussed, DLA does not obtain consumption and disposal information from the services. DLA states in its 2013 MRE strategic plan that it is vital to collaborate and share information with the military services to continually improve processes. DLA officials stated that DLA does not obtain information from the services on consumption and disposals because DLA's responsibility ends once it sells MREs to the services. Service officials agreed that it is the responsibility of the services to incorporate information related to usage of MREs in determining their requirements for MRE purchases from DLA. However, DLA acknowledges in the

strategic plan that sharing information about the military services' demand and usage patterns will be vital to making purchase decisions. Officials from the Army, Marine Corps, and Air Force stated that they monitor the consumption of MREs. Further, service officials stated that while they do not monitor total MRE disposals at this time, they do collect and track some information regarding disposals when this information is provided by units and could provide this information to DLA if requested.

Such information, along with the information DLA already tracks, could provide further insight on potential changes in the services' future demand for MREs during peacetime and help DLA in managing its MRE inventory. DLA reports in its MRE strategic plan that it intends to continue monthly coordination phone calls with the services and to include effects of sequestration and training budgets as items for discussion. As there is already considerable existing coordination between DLA and the military services, sharing additional information related to changes in MRE consumption and disposals could provide additional insight to DLA on service demand and usage patterns. In the absence of such information, DLA's information regarding future service demand for MREs may be limited, making it difficult to optimize the MRE supply chain across DOD. Obtaining this additional information from the services would help DLA ensure that, consistent with DOD guidance, its MRE supply chain is agile and responsive to customer requirements during peacetime and war while balancing risk and total cost.

The difficulty of forecasting demand for items has been a recurring inventory-management problem across DOD. Previous GAO reports have cited difficulty with demand forecasting at each of the services and DLA.³⁶ In addition, we have identified DOD supply-chain management as a high-risk area since 1990 due in part to weaknesses in accurately forecasting the demand for spare parts.³⁷ Furthermore, DOD issued its

³⁶See [GAO-14-495](#); *Defense Inventory: Defense Logistics Agency Needs to Expand on Efforts to More Effectively Manage Spare Parts*, (Washington, D.C.: May 11, 2010); *Defense Inventory: Army Needs to Evaluate Impact of Recent Actions to Improve Demand Forecasts for Spare Parts*, [GAO-09-199](#) (Washington, D.C.: Jan. 12, 2009); *Defense Inventory: Management Actions Needed to Improve the Cost Efficiency of Navy's Spare Parts Inventory*, [GAO-09-103](#) (Washington, D.C.: Dec. 12, 2008); and *Defense Inventory: Opportunities Exist to Save Billions by Reducing Air Force's Unneeded Spare Parts Inventory*, [GAO-07-232](#) (Washington, D.C.: Apr. 27, 2007).

³⁷GAO, *High-Risk Series: An Update*, [GAO-15-290](#) (Washington, D.C.: February 2015) and *High-Risk Series: An Update*, [GAO-13-283](#) (Washington, D.C.: February 2013).

Comprehensive Inventory Management Improvement Plan to focus, in part, on improving the accuracy of demand forecasts. Finally, the Office of the Deputy Assistant Secretary of Defense for Supply Chain Integration commissioned a study on forecasting across the department that recommended that DLA and the services should tailor their approach based on an item's demand pattern.

DLA Employs Various Strategies to Balance Cost and Readiness in Managing WRM Requirements

DLA uses various supply-chain strategies to balance cost with readiness in meeting the need for items identified as WRM and needed for surges associated with new contingencies or crises. DLA is working to reduce its on-hand inventory to reduce costs, but will continue to stock certain types of items, such as those that are military-unique or of limited availability. On the other hand, DLA seeks to contract for fast access to those items that are readily available on the commercial market that would be costly to stock, such as medical supplies. Further, DLA for many years has been seeking to facilitate and improve access to certain WRM items through its Warstopper Program.

DLA Is Working to Reduce Its On-Hand Inventory but Will Continue to Stock Certain Types of Items

DLA has sought to reduce its on-hand inventory, including WRM items, to gain certain benefits, but will continue to stock items that are, among other things, military-unique or of limited availability. In a June 2014 report, we found that DLA had set an internal goal in 2012 for reducing inventory and disposing of nearly \$4 billion of on-hand inventory, and that it accomplished this goal in fiscal year 2013.³⁸ According to DLA headquarters officials, the benefits of reducing on-hand inventory are (1) achieving cost savings by reducing the warehouse infrastructure needed to store on-hand inventory and (2) preventing reductions to DLA's working-capital fund obligational authority, which might reduce supply availability for the military customers.

As part of its responsibilities to perform storage and distribution functions for WRM in support of operational requirements, DLA keeps on-hand assets that are above current needs (in other words, the assets are in excess of the approved acquisition objective and being held as retention stock) if the materiel will help to meet a service WRM requirement. DLA recategorizes such stock as WRM in its inventory stratification reporting,

³⁸ [GAO-14-495](#).

and this stock becomes part of the approved acquisition objective. This recategorization protects the WRM stocks from disposal that could otherwise occur. However, these stocks are not otherwise managed or stored separately specifically for the purpose of being available in the event of a military operation. Rather, the inventory is comingled with regular stocks, and DLA issues these stocks in response to customer requisitions, whether for peacetime needs or in response to a surge requirement related to a military operation.

DLA officials stated that there are certain types of items that need to be stocked in order to ensure they are available for surge needs, such as those items that are military-unique or of limited availability. Further, small items that are low cost and without shelf-life constraints can be stocked. The officials stated that decisions to stock items are made on a case-by-case basis depending on the assessment of the responsible supply-chain managers, which includes an assessment of the surge needs associated with an item. Some examples of military-unique items stocked by DLA are camouflaged bandages, chemical protection suits, and operational rations, including MREs. As another example, supply-chain managers from the construction and equipment supply chain stated that DLA stocks a type of matting (called AM2 matting) that can be configured into landing pads for expeditionary aircraft because it is of limited availability and military-specific. Industrial hardware supply-chain managers told us that fasteners, nuts, and bolts are stocked in DLA depots because many are low cost and without shelf-life constraints. Further, DLA officials told us that these items do not take up considerable storage space in DLA storage depots.

DLA also has sought to comingle its stocks with service stocks to gain efficiencies and reduce storage and transportation costs. These initiatives are not focused specifically on WRM inventories since WRM stocks are not maintained or stored separately from other stocks, but do include items that have WRM requirements. For example, DLA and the Army have a joint initiative under way to transfer sustainment stocks of DLA-managed items previously owned by the Army to DLA. When transferred, these items would be comingled in DLA storage facilities. Army officials stated that because of efficiencies that DLA can provide, such as improved forecasting and better rotation of inventory, the Army will have to buy and stock less prepositioned inventory and will have fewer disposals due to shelf-life issues.

DLA Seeks to Contract for Fast Access to Readily Available Commercial Items

To maximize use of funds and minimize inventory storage costs, DLA attempts to meet some WRM requirements by contracting for fast access to materiel that is readily available from commercial sources when practicable.³⁹ DLA makes use of commercial practices, such as prime-vendor contracts, to obtain commercial goods and supplies.⁴⁰ The intent of such commercial practices is to decrease the need for and costs of maintaining government inventory.

DLA also acquires items through contingency contracts with industry as an alternative to stocking items on shelves.⁴¹ A DLA official stated that the agency's long-term contracts with industry attempt to leverage the commercial marketplace to acquire surge coverage to offset the need to stock items as WRM. As such, contracts can include surge and sustainment clauses to provide access to items with WRM requirements when the need for them arises. For example, according to DLA officials, since medical items are costly to stock and have limited shelf life, DLA's medical supply chain uses contingency contracts to acquire the majority of its items. In recent years, DLA has sought to stock fewer items within the medical supply chain and relied more on contingency contracts. A DLA official stated that this strategy had improved delivery times from over 200 days prior to operations in Iraq and Afghanistan to a current delivery time of 3 to 5 days. This official stated that when DLA contracts for access to medical inventory and obtains the inventory when needed, it does not have to be stocked on DOD shelves, which prevents wasting money on stocked items that must be later destroyed due to expired shelf life and ensures that medical professionals and their patients obtain high-quality products.

³⁹DODI 3110.06.

⁴⁰Under the prime vendor concept, DOD relies on a distributor of a commercial product line, who provides that product line and incidental services to customers in an assigned region or area of responsibility. Products or services are to be delivered within a specified period after order placement. See GAO, *Defense Management: Attention Is Needed to Improve Oversight of DLA Prime Vendor Program*, GAO 06-739R, (Washington, D.C.: June 19, 2006).

⁴¹The *Defense Contingency Contracting Handbook* states that contingency contracting encompasses all contracting performed in a contingency environment. A contingency can occur domestically or overseas, and fall anywhere on the broad range of military operations, from major wars to emergency responses. According to an official from DLA's medical supply chain, DLA uses various types of contingency contracts to guarantee access to products required by troops for initial deployment and to sustain military operations.

DLA also incorporates surge clauses into its contracts for some items that it maintains in its stocks. For example, MREs are stocked, but DLA may obtain additional supplies of these if needed through surge clauses. DLA officials stated that the current contract between DLA and MRE-producing companies outlines specific guidelines for each company to produce MREs in the event of a surge requirement that results from various scenarios, including new or escalating military operations, natural disasters, or other emergencies.

DLA Uses Its Warstopper Program to Facilitate and Improve Access to Certain Items

In addition to stocking certain items and seeking to establish contracts that can rapidly provide items to meet surge needs, DLA has a Warstopper Program that is aimed at facilitating and improving access to certain items by enabling DLA to maintain an industrial base for critical “go-to-war” items. DLA uses Warstopper funds to address weaknesses in certain supply chains by making targeted investments in industry that guarantee DLA access to materiel and enable industry to increase production when needed.

The Warstopper Program was authorized by Congress in the early 1990s as a result of critical shortages for certain items that occurred during Operation Desert Storm in 1991.⁴² These items generally had high demand during operations, but low demand during peacetime. DLA was designated the lead for the program, and Congress began funding the program in fiscal year 1992. DLA’s guidance regarding the Warstopper Program states that its purpose is to fund initiatives that ensure materiel availability when DLA’s normal peacetime procurements, inventory, and service prepositioned war reserve stocks are not adequate to meet the services’ go-to-war shortfalls for critical materiel.⁴³ Warstopper investments are intended to facilitate the acceleration of production for critical items and maintain critical industrial capability. Further, the guidance states that DLA manages the Warstopper Program to ensure the transition from peacetime to wartime is supported by a viable industrial base despite the variable demand patterns, technology

⁴²H.R. Conf. Rep. No. 102-311, at 521 (1991), accompanying the National Defense Act for Fiscal Years 1992 and 1993.

⁴³DLA Instruction 1212, *Industrial Capabilities Program—Manage the Warstopper Program* (Aug. 13, 2012).

inhibitors, skill retention, and general industry issues that may exist for DLA-managed go-to-war items.

Items must meet certain mission, demand, or production characteristic criteria to be funded through the Warstopper Program. Regarding mission characteristics, at the establishment of the program, Congress identified certain items to be included as part of the program due to the critical shortages that emerged during Operation Desert Storm, such as operational rations (including MREs), nerve-agent antidote auto-injectors, chemical protective gloves, chemical protective suits, combat boots, and barrier materials. Aside from these congressionally-identified items, other mission characteristics include life-saving or life-preserving items and items that, if unavailable, can severely affect a strategic warfighting capability. For example, medical items and personal protection items with high value to the preservation of a servicemember's life (examples include helmets, body armor, fire-retardant garments, medical patient movement items and surgical equipment) are important for DOD's warfighting capability, according to the Warstopper Program guidance. Similarly, the guidance includes examples of energy items and repair parts capable of stopping a strategic warfighter capability if they are unavailable, such as lithium batteries and helicopter windshields. Demand characteristics that can facilitate an item's inclusion in the Warstopper Program include items with a validated WRM requirement and those with a low peacetime and high wartime demand. Lastly, production characteristics that will exceed the industrial capability to meet wartime requirements, such as long lead times or short shelf lives, could make an item eligible for Warstopper funding.

DLA conducts research and analysis to determine whether an investment is needed to help ensure availability of items and materiel that meet the criteria for the program. DLA guidance states that studies, data collection, and reports are outputs of the program that provide information to assess the state of the industrial base and develop industrial solutions, as opposed to buying more stocks to store. The office responsible for managing a particular item or supply chain develops a proposal for the investment and submits the proposal to DLA headquarters for approval. The investment may take the form of one of several types of contingency contracts or other means of investment, such as the purchase of critical raw materials or the purchase of government-provided equipment to speed up or modernize industrial processes. For example, DLA's subsistence office developed a proposal to provide operational ration manufacturers with two types of machines to assist with the cooking and filling and sealing process for operational rations, including MREs.

Subsistence officials stated that manufacturers can use the equipment from the government for commercial use so that the equipment does not fall into disrepair from lack of use. DLA is to review Warstopper investments annually. According to DLA officials, since 1993, a cumulative investment total of \$856 million in Warstopper funding has resulted in cost avoidances for the department of about \$5.9 billion that would have been spent on stocking items and other related costs.

Past investment items include operational rations, certain types of batteries, fiber used in flame-retardant items, specialty steels for repair parts, nerve-agent antidote auto-injectors, and certain types of military specific barriers, among others. DLA officials provided examples of how the program has increased availability of items that are needed to meet surge wartime needs.

- Regarding the fiber used in fire-retardant items, \$1.37 million of Warstopper funding was invested to increase surge output by up to 54 percent in the first 180 days of surge needs.
- Similarly, \$6.1 million was invested in long-lead time components of AM2 matting used to create landing pads for expeditionary aircraft, which subsequently increased surge output by 85 percent in the first 180 days.

Numerous items within the medical supply chain also are funded by Warstopper investments. DLA's medical supply chain was budgeted for over \$36 million in Warstopper funds in fiscal year 2015, and it executes approximately 55 percent of DLA's Warstopper budget annually. Through the use of over 155 contingency contracts funded by the Warstopper Program in the medical supply chain, DLA officials stated that the department has purchased access to over \$280 million of medical and pharmaceutical supplies at a cost of \$24 million for contract fees. DLA officials stated that these contingency contracts exist with manufacturers, distributors, and prime vendors.

Conclusions

The ready availability of war reserve materiel items is central to ensuring that U.S. forces can be sustained in the early stages of operations, before regular supply chains are established. By utilizing a variety of contracting strategies for items that are readily available, stocking some military-essential items, and acting to support the integrity of its supply chains through the Warstopper program, DLA is working to meet warfighter needs while also pursuing efficiencies in its operations at a time of budget

constraints and uncertainty. DLA has also put effort into managing the MRE inventory and, in doing so, monitors various types of data. However, DLA lacks other analysis and information that could be useful in managing this inventory. For instance, without conducting an analysis that provides more information on industry capabilities than its previous studies, DLA does not have reasonable assurance that it is balancing readiness and budget priorities with the need to sustain the industrial base in the most efficient way. Similarly, without obtaining information from the military services about potential changes to consumption and disposals of MREs that could affect future demand, DLA may be limited in its ability to optimize the supply chain across the department. Forecasting demand for supplies has been a long-standing challenge for DOD in managing its inventories, and additional information sharing among DLA and the services could help to reduce uncertainty about the future demand for MREs. Such analysis and information will help ensure that DLA, consistent with DOD guidance, is acquiring, sizing, and managing MRE war reserve stocks to maximize flexibility while minimizing investment.

Recommendations for Executive Action

To obtain information useful to DLA's decision making regarding MRE inventory levels, we recommend that the Assistant Secretary of Defense for Logistics and Materiel Readiness direct the Director, DLA, to take the following two actions:

- Conduct an analytical study of the MRE industry's capabilities that provides information on the level of MRE purchases needed to sustain the industrial base, including the ability to respond to a surge requirement. Specifically, the analysis should assess the validity of the current annual purchase objective of 2.5 million cases.
- Request that the military services, as part of existing coordination efforts, share information on potential changes to MRE consumption and disposals that could affect future demand.

Agency Comments and Our Evaluation

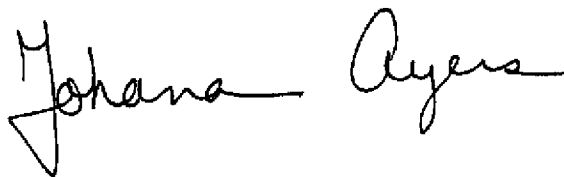
We provided a draft of this report to DOD for comment. In written comments, DOD concurred with our two recommendations aimed at improving the information used as part of DLA's decision making regarding MRE inventory levels. DOD's comments are reprinted in their entirety in appendix II. DOD also provided technical comments, which we incorporated into the report as appropriate.

DOD concurred with our first recommendation that DLA conduct an analytical study of the MRE industry's capabilities that provides information on the level of MRE purchases needed to sustain the industrial base, including the ability to respond to a surge requirement, and that this analysis assess the validity of the current annual purchase objective of 2.5 million cases. DOD stated in its written response that DLA will conduct an analytical study on the level of MRE purchases needed to sustain the industrial base. DOD noted that this effort would require the participation and cooperation of industry, as we acknowledge in our report. DOD did not explicitly state that this analysis would assess the validity of the current purchase objective of 2.5 million cases, and therefore we encourage DLA to plan to incorporate this assessment as part of the analysis it conducts.

DOD concurred with our second recommendation that DLA request that the military services, as part of existing coordination efforts, share information on potential changes to MRE consumption and disposals that could affect future demand. We note that we made minor revisions to this recommendation after the draft was provided to DOD for its comment in order to clarify the recommendation in response to DOD's technical comments. This revision did not alter the original intent of the recommendation. In its written response, DOD stated that it concurs and the military services will share potential changes in usage of MREs in the existing quarterly reviews with DLA.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense; the Assistant Secretary of Defense for Logistics and Materiel Readiness; the Director of DLA, and the Secretaries of the Army, Navy, and Air Force. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staffs have any questions about this report, please contact Johana Ayers at (202) 512-5741 or ayersj@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.

A handwritten signature in black ink that reads "Johana Ayers". The signature is fluid and cursive, with the first name "Johana" and the last name "Ayers" clearly distinguishable.

Johana R. Ayers
Director, Defense Capabilities and Management

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The Honorable Pete Visclosky
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Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Military Service War Reserve Materiel Programs

The military services have different approaches for managing their war reserve materiel (WRM) programs.

- **Army:** The Army categorizes WRM as part of its Army Prepositioned Stock program. These stocks consist of major end items to replace combat losses and war reserve secondary items to replace supplies consumed in battle. Army Materiel Command manages the Army Prepositioned Stock program and is required to coordinate with the Defense Logistics Agency (DLA) and other organizations that provide equipment or stock for the program, such as operational rations and medical supplies.¹ Army logistics officials said revised Army guidance will consolidate information from several regulations that previously set policy and procedural guidance for management, use, and storage of prepositioned stock, as well as standardizing terminology within the prepositioning program.
- **Navy:** The Navy's deployed ships carry the items necessary for operations during their deployment at sea. The Navy has an "allowancing" process to outfit ships with the correct stocks for a deployment, and it monitors metrics on the performance of these allowances. Naval supply guidance states that certain items are prepositioned as war reserve stocks, such as major assemblies, components, and equipment related to nuclear items and materials.² Further, the Navy coordinates with DLA to provide prepositioned war reserve requirements for all types of fuels.
- **Marine Corps:** The Marine Corps maintains materiel as WRM to sustain its operating forces from the beginning of an operation to the establishment of theater support capabilities.³ The Deputy Commandant for Installations and Logistics coordinates the WRM Program and is responsible for the service's overarching WRM policy and guidance. Marine Corps Logistics Command executes key aspects of the WRM program, including interacting with DLA.
- **Air Force:** Air Force WRM consists of prepositioned equipment, vehicles, and consumables to support operations. Air Force guidance states that WRM is intended to reduce the time required to achieve an

¹Army Regulation 710-1, *Inventory Management: Centralized Inventory Management of the Army Supply System* (Sept. 20, 2007).

²U.S. Navy, *Navy Supply Manual*, vol. II, ch. 6, "Supply System Management".

³Marine Corps Order 4400.39, *War Reserve Materiel Policy* (Feb. 8, 2011).

operational capability.⁴ The Air Force is currently undertaking a reorganization of its WRM program. In the past, each Air Force major command had its own WRM program. Air Force officials stated that leadership decided to centralize and streamline the program to be more transparent and have “one voice” for WRM. In January 2015, the Air Force issued revised WRM guidance that details changes to the program and its management, including the development of a WRM global strategy and the appointment of a global manager of WRM.⁵ The revised guidance designates the Air Force Materiel Command as the global manager for WRM, which in turn assigned its subordinate Air Force Sustainment Center as global manager. Within the Air Force Sustainment Center, the 635th Supply Chain Operations Wing at Scott Air Force Base will execute centralized WRM global management. Offices that manage unique WRM items, such as ammunition and medical items, must coordinate with the global manager. Functional managers of items such as fuel and subsistence must coordinate with DLA for items it manages; however, the global manager coordinates with DLA for other items.

⁴Air Force Instruction 25-101, *Air Force War Reserve Materiel Policies and Guidance* (Jan. 14, 2015).

⁵Air Force Instruction 25-101 and Air Force Policy Directive 25-1, *War Reserve Materiel* (Jan. 15, 2015).

Appendix II: Comments from the Department of Defense



LOGISTICS AND
MATERIEL READINESS

ASSISTANT SECRETARY OF DEFENSE
3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

APR 27 2015

Ms. Johana Ayers
Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

Dear Ms. Ayers:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-15-474, "DEFENSE INVENTORY: DOD Needs Additional Information for Managing War Reserve Levels of Meals Ready to Eat," dated March 30, 2015 (GAO Code 351981). Detailed comments on the report recommendations are enclosed.

Sincerely,

A handwritten signature in black ink, reading "David J. Berteau".

David J. Berteau

Enclosure:
As stated

GAO DRAFT REPORT DATED MARCH 30, 2015
GAO-15-474 (GAO CODE 351981)

“DEFENSE INVENTORY: DOD Needs Additional Information for Managing War
Reserve Levels of Meals Ready to Eat”

DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO RECOMMENDATIONS

RECOMMENDATION # 1: To obtain information useful to DLA’s decision-making regarding MRE inventory levels, we recommend that the Assistant Secretary of Defense for Logistics and Materiel Readiness direct the Director, DLA, to conduct an analytical study of the MRE industry’s capabilities that provides information on the level of MRE purchases needed to sustain the industrial base, including the ability to respond to a surge requirement. Specifically, the analysis should assess the validity of the current annual purchase objective of 2.5 million cases.

DoD RESPONSE: Concur. DLA will conduct an analytical study on the level of MRE purchases needed to sustain the industrial base. As indicated in the report, the study will require the participation and cooperation of industry to provide the insight GAO recommends.

RECOMMENDATION # 2: To obtain information useful to DLA’s decision-making regarding MRE inventory levels, we recommend that the Assistant Secretary of Defense for Logistics and Materiel Readiness direct the Director, DLA, to request that the military services, as part of existing coordination efforts, share information on potential changes to their peacetime usage of MREs, including consumption and disposals, that could affect future demand.

DoD RESPONSE: Concur. The military services will share potential changes in peacetime usage of MREs in the existing quarterly reviews with DLA.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Johana R. Ayers, (202) 512-5741, or ayersj@gao.gov

Staff Acknowledgments

In addition to the individual named above, key contributors to this report were Thomas Gosling (Assistant Director), Charlene Calhoon, Timothy Carr, Martin De Alteriis, Suzanne M. Perkins, Amie Steele, Sabrina C. Streagle, and Erik Wilkins-McKee.

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